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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/725,326	12/01/2003	Fwu-Iuan Hshieh	GS 145 D1	2693
27774	7590	06/16/2005	EXAMINER	
MAYER, FORTKORT & WILLIAMS, PC 251 NORTH AVENUE WEST 2ND FLOOR WESTFIELD, NJ 07090			CAO, PHAT X	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary

Application No.

10/725,326

Applicant(s)

HSHIEH ET AL.

Examiner

Phat X. Cao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 April 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 31 and 32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 31 and 32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The cancellation of claims 1-30 in Paper filed on 4/11/05 is acknowledged.

Claim Objections

2. Claim 31 is objected to because of the following informalities: in claims 31, line 17, a phrase "forming a **source** region of said first conductivity type" should be changed to "forming a region of said first conductivity type" because "a region of said first conductivity type" 212 formed within an upper portion of the epitaxial layer over the deep region 219 (Fig. 3F) is not "a source region". Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okabe et al (US. 5,925,911) in view of Chiozzi et al (US. 6,194,761).

Okabe (Figs. 3-10) discloses a method of forming a trench DMOS transistor device comprising: providing a substrate 1 of a first conductivity type (n+), the substrate acting as a common drain region for the device (column 4, lines 3-4); depositing an epitaxial layer 2 of the first conductivity type (n-) over the substrate, the epitaxial layer 2 (n-) having a lower majority carrier concentration than the substrate 1 (n+); forming a body region 40 of a second conductivity type (p) within an upper portion of the epitaxial layer 2; etching a trench 60 (Fig. 7) extending into the epitaxial layer 2

from an upper surface of the epitaxial layer 2; forming an insulating layer 6 lining at least a portion of the trench; forming a conductive region 7 within the trench adjacent the insulating layer 6; forming a low resistivity deep region 31 of the first conductivity type (n+) by implantation and diffusion (column 5, lines 14-18), the low resistivity deep region 31 extending into the device from an upper surface of the epitaxial layer 2 and acting to provide electrical contact with the substrate 1; and forming a source region 5 of the first conductivity type (n+) within an upper portion of the body region 40 and adjacent the trench 60.

Okabe does not disclose the step of forming a region of same conductivity type with the deep region 31 and completely overlying the deep region 31.

However, Chiozzi (Fig. 3) teaches the forming of a low resistivity deep region 19 of a first conductivity type (n+) and the forming of a region (not labeled) of the same conductivity type (n+) with the deep region 19 within the upper portion of the epitaxial layer 10 and completely overlying the deep region 19. Accordingly, it would have been obvious to modify the process of Okabe by forming a region of the same conductivity type with the deep region 31 within the upper portion of the epitaxial layer 2 and completely overlying the deep region 31 because as taught by Chiozzi, such modified process would provide a deep region having lower drain contact resistivity (column 3, lines 29-34).

Response to Arguments

5. Applicant argues that the applied references do not suggest the invention as amended. However, this is a new issue and the new reference is applied (Chiozzi et al)

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in the new ground of rejection for showing the obviousness of the invention as amended.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phat X. Cao whose telephone number is (571) 272-1703. The examiner can normally be reached on Monday - Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PC
June 13, 2005


PHAT X. CAO
PRIMARY EXAMINER